

CLAIMS

1. A structure comprising:

a substrate having a top surface for receiving a die;

a printed circuit board attached to a bottom surface of said substrate;

5 at least one via in said substrate;

said at least one via providing an electrical connection between a signal bond pad of
said die and said printed circuit board.

10 2. The structure of claim 1 wherein said die is a semiconductor die.

15 3. The structure of claim 1 wherein said substrate comprises organic
material.

4. The structure of claim 3 wherein said organic material is selected from the
group consisting of polytetrafluoroethylene material and an FR4 based laminate
15 material.

20 5. The structure of claim 1 wherein said substrate comprises a ceramic material.

6. The structure of claim 1 wherein said at least one via provides an electrical
connection between a substrate bond pad and said printed circuit board, wherein said
substrate bond pad is electrically connected to said signal bond pad of said die.

7. The structure of claim 6 wherein said at least one via abuts said substrate bond pad.

8. The structure of claim 6 wherein said substrate bond pad is electrically connected to said signal bond pad of said die by a signal bonding wire.

9. The structure of claim 1 wherein said at least one via provides an electrical connection between said signal bond pad of said die and a land, said land being electrically connected to said printed circuit board.

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10. The structure of claim 9 wherein said at least one via abuts said land.

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11. The structure of claim 1 wherein said at least one via provides an electrical connection between a substrate bond pad and a land, wherein said substrate bond pad is electrically connected to said signal bond pad of said die, and wherein said land is electrically connected to said printed circuit board.

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12. The structure of claim 11 wherein said at least one via abuts said substrate bond pad and said land.

13. The structure of claim 11 wherein said substrate bond pad is electrically connected to said signal bond pad of said die by a signal bonding wire.

14. The structure of claim 12 wherein said substrate bond pad is electrically connected to said signal bond pad of said die pad by a signal bonding wire.

15. The structure of claim 1 wherein said at least one via comprises copper.

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16. The structure of claim 1 wherein said at least one via comprises a thermally conductive material.

17. A structure comprising:

10 a substrate having a top surface and a bottom surface;

a semiconductor die attached to said top surface of said substrate;

a heat spreader attached to said bottom surface of said substrate;

a first via in said substrate;

said first via providing a connection between said semiconductor die and said heat

15 spreader.

18. The structure of claim 17 wherein said heat spreader is attached to a printed circuit board.

20 19. The structure of claim 17 wherein said heat spreader is an electrical conductor.

20. The structure of claim 19 further comprising a substrate down bond area attached to said top surface of said substrate.

21. The structure of claim 20 wherein said first via provides an electrical connection between said substrate down bond area and said heat spreader.

22. The structure of claim 21 wherein a semiconductor die ground bond pad on said semiconductor die is electrically connected to said substrate down bond area by a down bonding wire.

23. The structure of claim 19 wherein said heat spreader is attached to a printed circuit board by solder.

24. The structure of claim 17 wherein said heat spreader is a thermal conductor.

25. The structure of claim 24 wherein said heat spreader is attached to a printed circuit board by solder.

26. The structure of claim 17 wherein a second via in said substrate provides a connection between a signal bond pad of said semiconductor die and a printed circuit board.

27. The structure of claim 17 wherein said first via provides an electrical connection between said semiconductor die and said heat spreader.

28. The structure of claim 26 wherein said second via provides an electrical connection between said semiconductor die and said heat spreader.
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29. The structure of claim 17 wherein said first via provides a thermal connection between said semiconductor die and said heat spreader.

10 30. The structure of claim 26 wherein said second via provides a thermal connection between said semiconductor die and said heat spreader.

15 31. The structure of claim 17 wherein said substrate comprises organic material.

32. The structure of claim 31 wherein said organic material is selected from the group consisting of polytetrafluoroethylene material and an FR4 based laminate material.

20 33. The structure of claim 17 wherein said substrate comprises a ceramic material.

34. The structure of claim 26 wherein said second via provides an electrical connection between a substrate bond pad and said printed circuit board, wherein said substrate bond pad is electrically connected to said signal bond pad of said semiconductor die.

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35. The structure of claim 34 wherein said second via abuts said substrate bond pad.

36. The structure of claim 34 wherein said substrate bond pad is electrically connected to said signal bond pad of said semiconductor die by a signal bonding wire.

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37. The structure of claim 26 wherein said second via provides an electrical connection between said signal bond pad of said semiconductor die and a land, said land being electrically connected to said printed circuit board.

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38. The structure of claim 37 wherein said second via abuts said land.

39. The structure of claim 26 wherein said second via provides an electrical connection between a substrate bond pad and a land, wherein said substrate bond pad is electrically connected to said signal bond pad of said semiconductor die, and wherein said land is electrically connected to said printed circuit board.

40. The structure of claim 39 wherein said second via abuts said substrate bond pad and said land.

41. The structure of claim 39 wherein said substrate bond pad is electrically

5 connected to said signal bond pad of said semiconductor die by a signal bonding wire.

42. The structure of claim 17 wherein said first via comprises copper.

43. The structure of claim 26 wherein said second via comprises copper.

10 44. A structure comprising:

a substrate having a top surface and a bottom surface;

a semiconductor die attached to said top surface of said substrate;

a heat spreader attached to said bottom surface of said substrate;

15 a first plurality of vias in said substrate;

said first plurality of vias providing a connection between said semiconductor die

and said heat spreader.

45. The structure of claim 44 wherein said heat spreader is attached to a printed

20 circuit board.

46. The structure of claim 45 wherein a second plurality of vias in said substrate provide connections between a plurality of signal bond pads of said semiconductor die and said printed circuit board.

5 47. The structure of claim 44 further comprising a substrate down bond area attached to said top surface of said substrate.

10 48. The structure of claim 47 wherein said first plurality of vias provide an electrical connection between said substrate down bond area and said heat spreader.

49. The structure of claim 48 wherein a ground bond pad on said semiconductor die is electrically connected to said substrate down bond area by a down bonding wire.

15 50. The structure of claim 44 wherein said first plurality of vias provides an electrical connection between said semiconductor die and said heat spreader.

51. The structure of claim 44 wherein said first plurality of vias provides a thermal connection between said semiconductor die and said heat spreader.

20 52. The structure of claim 46 wherein said second plurality of vias provide electrical connections between a plurality of substrate bond pads and said printed circuit board, wherein each of said plurality of substrate bond pads is electrically connected to a respective one of said plurality of signal bond pads of said semiconductor die.

53. The structure of claim 46 wherein said second plurality of vias provide electrical connections between each one of said plurality of signal bond pads of said semiconductor die and a respective one of a plurality of lands, said plurality of lands being electrically connected to said printed circuit board.

54. The structure of claim 44 wherein said first plurality of vias comprise copper.

10 55. The structure of claim 46 wherein said second plurality of vias comprise copper.

56. A method for fabricating a structure for receiving a semiconductor die, said method comprising steps of:

15 drilling a first hole in a substrate;
filling said first hole with metal to form a first via;
patterning a support pad on a top surface of said substrate, and patterning a heat spreader on a bottom surface of said substrate, said first via providing an electrical connection between said heat spreader and said support pad, said support pad being
20 suitable for receiving said semiconductor die.

57. The method of claim 56 further comprising the steps of:
drilling a second hole in said substrate;

filling said second hole with metal to form a second via;
patterning a substrate bond pad on said top surface of said substrate, and patterning
a land on said bottom surface of said substrate, said second via providing an electrical
connection between said substrate bond pad and said land.

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58. The method of claim 57 further comprising the step of attaching said
semiconductor die to said support pad.

59. The method of claim 58 further comprising the step of patterning a substrate
10 down bond area on said top surface of said substrate, said substrate down bond area being
electrically connected to said support pad.

60. The method of claim 59 further comprising the step of electrically
connecting a ground bond pad of said semiconductor die to said substrate down bond area
15 by a down bonding wire.

61. The method of claim 58 further comprising the step of electrically
connecting a signal bond pad of said semiconductor die to said substrate bond pad by a
signal bonding wire, wherein said signal bond pad of said semiconductor die is
20 electrically connected to said land.

62. The method of claim 56 wherein said first via provides a thermal connection
between said heat spreader and said support pad.

63. The method of claim 58 further comprising the step of soldering a printed circuit board to said heat spreader, wherein said printed circuit board is electrically connected to said support pad.

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64. The method of claim 56 wherein said heat spreader is a thermal conductor.

65. The method of claim 56 wherein said support pad is a thermal conductor.

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66. The method of claim 56 wherein said via comprises copper.

67. The method of claim 56 wherein said substrate comprises organic material.

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68. The method of claim 67 wherein said organic material is selected from the group consisting of polytetrafluoroethylene material and an FR4 based laminate material.

69. The method of claim 56 wherein said substrate comprises a ceramic material.

70. The method of claim 56 wherein said heat spreader comprises copper.

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71. The method of claim 56 wherein said support pad comprises copper.